

CHEMICAL AND MICROBIOLOGICAL TEST RESULTS OF SOUND-SORB BERM AT THE EAST ELGIN SPORTSMAN'S ASSOCIATION, AYLMER, ONTARIO

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On August 16, 2002 York-Durham District staff sampled the Sound-Sorb berm at the East Elgin Sportsman's Association gun club near Aylmer, Ont. Two berms were sampled, one which had been in place since about March 2002 (east berm) and one which had been in place for only about 3 to 4 weeks (north berm). One core sample was taken from each using an AMS extendible soil core sampler with 40 cm length polycarbonate tube inserts. The insert allowed removal of an intact section which was capped at either end for transport back to the District office where it was sectioned and transferred to laboratory containers and submitted to the ministry's Laboratory Services Branch for analysis. A pile of fresh sand used to produce Sound-Sorb was also on the gun club property and a truck containing fresh Atlantic Packaging paper fibre biosolids arrived at the site. District staff collected samples of the sand and of the fresh paper fibre biosolids for analysis.

Results of the analyses are presented in Tables 1 and 2 attached. Table 3 presents the inorganic chemistry data for the Sound-Sorb berm at the East Elgin Sportsman's Association as it compares to the Sound-Sorb berm at the Oshawa Skeet and Gun Club. Table 3 also shows the chemistry data for Atlantic Packaging paper fibre biosolids as delivered to the East Elgin Sportsmen's Association as it compares to data for four fresh paper fibre biosolids samples taken from the Whitby plant of Atlantic Packaging Ltd. The latter data were presented in the June 2002 report on the Oshawa Skeet and Gun Club..

Given the complexity and cost of doing dioxin/furan testing on the samples, and the fact that dioxin/furans were very low in the fresh paper fibre and Oshawa Skeet and Gun Club samples reported on in the June 2002 report, these tests were not requested on the Aylmer samples. Similarly, PAHs were not requested, as they were reported at background levels in the June 2002 report. Instead chlorophenols were requested on the Aylmer samples, since chlorophenols in the fresh paper fibre had not been tested since 1998 and the Sierra Club of Canada had requested data on these parameters.

A general discussion on soil chemical processes and chemical transport through the soil for each of the parameters measured can be found in the Ministry of Environment and Energy's June 2002 report on the Oshawa Skeet and Gun Club.

The inorganic chemistry data samples from the Alymer berm cores and the fresh paper fibre biosolids delivered to the site to produce Sound-Sorb are below Table A, Contaminated Site Guideline concentrations in soil used for residential/parkland in a potable water situation. Similar to the findings at the Oshawa Skeet and Gun Club, the *E. coli* levels, (fecal indicator bacteria in the Almer berm were below the Class A fecal coliform guideline of 1000 cfu/g used by the US EPA guideline for the spreading of biosolids on agricultural land. (Levels below Class A guidelines mean that no waiting period is required prior to site use). The *E. coli* levels in the fresh biosolids on-site are below the US EPA Class B biosolids fecal coliform guideline (2×10^6 cfu/g). It is evident that within a matter of a month the composting that occurs in the berm results in the destruction of coliform bacteria. When coring the berm the metal corer used was very hot to touch providing further evidence of high internal berm temperatures while composting *in situ*.

The inorganic chemistry of samples from the Aylmer berm cores is below the typical range of uncontaminated Ontario soils (OTR) with the exception of copper which is higher than OTR levels but lower than Table A contaminated site guidelines. These findings are similar to those reported in the June 2002 report. The free cyanide concentrations are below detection limits for both the berm material and the fresh paper fibre biosolids delivered to the Aylmer site. Trace levels of free cyanide were found in the berm at the Oshawa Skeet and Gun Club.

Total petroleum hydrocarbons (TPH) in the berm cores exceed the Table A, Contaminated Site Guidelines (1100 ug/g). The hydrocarbons were comprised primarily of compounds in the C12 to C50 range. A mass spectrometry screen at the Oshawa Skeet and Gun Club, showed these to be primarily straight-chain n-alkane compounds. The berms at Aylmer varied from six months old to one month old, younger than the berm at the Oshawa Skeet and Gun Club. TPH levels found at Aylmer are higher (7,600 - 11,000 $\mu\text{g/g}$) than the concentration of found at the Oshawa Skeet and Gun Club (3400 $\mu\text{g/g}$) and are closer to the

concentration found in the fresh paper fibre biosolids delivered to the Aylmer site (13,000 µg/g). Volatile hydrocarbons such as toluene and xylenes, which were detected in the Oshawa Skeet and Gun Club berm at levels above the typical range of uncontaminated Ontario soils, were not detected in either the Aylmer berm cores or the fresh paper fibre biosolids delivered to the site. A Request For Proposal has been prepared for a site specific human and ecological health risk assessment to address the petroleum hydrocarbons and any other substances deemed to be of concern in the Sound-Sorb berm at the Oshawa Skeet and Gun Club.

Chlorophenols were not detected in the Sound-Sorb or fresh paper fibre biosolids at the Aylmer site. Acrylamide monomer was also measured in the Aylmer samples. Acrylamide was measured in the samples from the Oshawa Skeet and Gun Club in response to concern from members of the public about its presence as a residual in polyacrylamide which is used as a flocculant in biosolids settling processes at Atlantic Packaging. Results showed levels of approximately 0.1 µg/g in both the fresh paper fibre biosolids delivered to the Aylmer site and the berm itself. The level in the fresh biosolids delivered to the site is lower than the concentration found in the fresh paper fibre biosolids taken from Atlantic Packaging Ltd. (MOEE, 2002, Addendum) where a level of 9 µg/g was found. Acrylamide monomer is water soluble but will polymerize in the presence of light. The levels found in the berm are considered low. Contaminated site guidelines have not been developed for acrylamide. Canada and Ontario do not have a standard for acrylamide monomer in drinking water, however, the WHO recommends a drinking water guideline level of 0.5 µg/L and Australia uses a guideline level of 0.2µg/L. A commitment has been to measure acrylamide in test wells which have been installed at the at the Oshawa Skeet and Gun Club site.

Parameters which may provide evidence of the mixing efficiency of the paper fibre biosolids with sand to produce Sound-Sorb at an approximate 70: 30 ratio are loss on ignition ash content and titanium concentration. These concentrations indicate that the sand-PFB mixing is not homogenous and that the east berm samples contained more sand than the north berm samples. This is reflected in the chemistry, with the second core sample from the north berm containing the lowest amount of sand (as seen from loss-on-ignition ash content and titanium concentration) and having a chemistry closer to the fresh paper fibre biosolids.

Samples from the Aylmer berm show a chemistry which differs from the Oshawa Skeet and Gun Club primarily with regard to the local sand used during their construction. Total petroleum hydrocarbons, however, are higher than found at the Oshawa Skeet and Gun Club site. The higher TPH levels may reflect the newer material in the berm (i.e. a limited amount of bioremediation will have occurred). Based on the findings at the East Elgin Sportsman's Association, in conjunction with the results reported in June 2002 by the ministry on the Oshawa Skeet and Gun Club berm and fresh paper fibre, it is recommended that the ministry proceed with the work it is doing at the Oshawa Skeet and Gun Club. This work includes investigating the potential of Sound-Sorb to generate harmful bioaerosols, adversely effect groundwater and surface water, and cause unacceptable risk to human and ecological health.